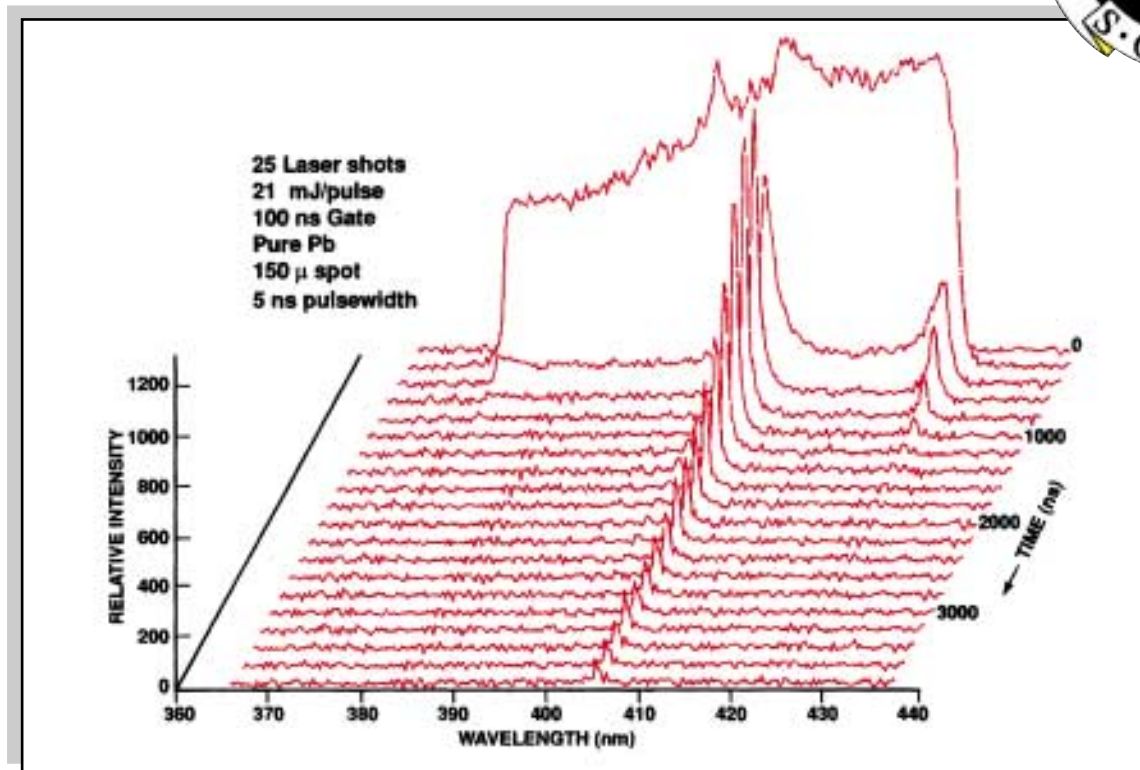


Tri-Service SCAPS Laser Induced Breakdown Spectroscopy

Detection, Identification, and Delineation of Heavy Metals



Tri-Service SCAPS Laser Induced Breakdown Spectroscopy (LIBS) Sensors offer fast, inexpensive, detailed characterization of metals contaminated sites.

Traditional methods of site characterization are costly and time consuming. Using the Laser Induced Breakdown Spectroscopy (LIBS) Sensors, deployed by the Tri-Service Site Characterization and Analysis Penetrator System (SCAPS), will result in reduced cost and time to characterize and remediate metals contaminated sites. SCAPS and its associated sensors provide the DoD, DOE, EPA, and the private sector with a cost-effective means to rapidly characterize subsurface conditions at contaminated sites through real time, on-site data acquisition and processing.



USAEC

Environmental Technology Division



Solutions

Delineating Subsurface Heavy Metals Contamination

The Tri-Service SCAPS Laser Induced Breakdown Spectroscopy (LIBS) Sensors are used in the detection, identification, and delineation of heavy metal contaminants in the unsaturated and capillary zones.

Two LIBS Sensors have been developed, by Naval Research and Development (NRaD) and U.S. Army Engineer Waterways Experiment Station (USAEWES), that are currently being field tested to complete final modifications and demonstrated to pursue regulatory acceptance.

The LIBS Sensors utilize high power pulsed lasers to generate a plasma in the soil. The output of the laser beam is focused on the surface of the soil outside the probe. This causes a breakdown of the soil and the formation of a high temperature plasma spark. For a brief time, this plasma spark emits light.

The wavelengths of the light, or the constituent colors, are indicative of the elements present in the soil, i.e., specific metals correspond to specific wavelengths. The brightness of the spark light at a metal's wavelength indicates how much of that metal is present.

A spectrometer breaks this light into its constituent colors, much like the action of a prism. This information is analyzed onboard the SCAPS truck to obtain qualitative and quantitative data from the characteristic signature for each of the metals.

The sensor developed by NRaD is configured with the laser in the SCAPS truck and utilizes a fiber optics system, while the USAEWES configuration houses the laser and fiber optics components within the probe. An analysis of the advantages and disadvantages of each design will be conducted throughout the demonstrations.

Application of innovative SCAPS field screening technologies, such as the LIBS Sensors, results in faster, more detailed site characterization at significantly reduced costs compared to traditional methods.

For more information on USAEC-ETD technology programs please call the:

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